<u>Amendments to the Claims:</u>

This listing of claims will replace all prior versions, and listings, of claims in the application:

<u>Listing of Claims:</u>

Claim 1 (Currently Amended) A design support apparatus for a resin mold product made of thermosetting resin, comprising:

a flow analysis means which analyzes a flow of thermosetting resin injected into a resin filling cavity to mold said resin mold product, using a finite difference method or a finite element method;

a residual strain calculation means which calculates residual strain ~~(or stress)~~ of the thermosetting resin after heat shrinkage of the thermosetting resin injected into the resin filling cavity to mold said resin mold product; and

a strength analysis means which analyzes strength of said resin mold product, using a finite element method;

wherein:

<u>said flow analysis means indicates a reaction rate model by using an equation</u>

<u>A(t) = Q(t)/ Q(o)</u>

<u>wherein A(t) is reaction rate whose initial value at the reaction is 0, and the reaction rate in the initial period is saturated toward 1 with lapse of time,</u>

<u>t is time,</u>

<u>Q(t) is heat release value until time t,</u>

<u>Q(o) is a gloss heat release value until the end of the reaction,</u>

<u>and calculates viscosity η, coefficient of elasticity E(T), and linear curing strain</u>

component ε1 by replacing the changes of each component with change of the reaction rate A(t),

said flow analysis means calculates a temperature, a coefficient of elasticity and a strain ~~(or stress)~~ component of the thermosetting resin at a time of heat curing, for each of first three-dimensional solid elements used for flow analysis and gives the calculated result to the residual strain calculation means;

said residual strain calculation means uses correspondence between each of second three-dimensional solid elements used for strength analysis by said strength analysis means and each of said first three-dimensional solid elements, and the temperature, the coefficient of elasticity and the strain ~~(or stress)~~ component calculated for each of said first three-dimensional solid elements by said flow analysis means, in order to set a temperature, a coefficient of elasticity and a strain ~~(or stress)~~ component at the time of heat curing for each of the second three-dimensional solid elements, and calculates residual strain ~~(or stress)~~ after the heat shrinkage for each of said second three-dimensional solid elements; and

said strength analysis means sets the residual strain ~~(or stress)~~ after the heat shrinkage, which is calculated by said residual strain calculation means, to said each of said second three-dimensional solid elements, and analyzes the strength of said resin mold product.

Claim 2 (Currently Amended) The design support apparatus for a resin mold product, according to Claim 1, wherein:

said flow analysis means calculates changes of a temperature and ~~a~~the reaction rate expressed as functions of time, and a change of a viscosity expressed

as a function of the reaction rate, for each time step and for each of said first three-dimensional solid elements, and further

for each of first three-dimensional solid elements whose reaction rates reach a reaction rate of gelling, said flow analysis means calculates the strain ~~(stress)~~ component at the time of the heat curing, based on a relation between ~~a~~the reaction rate and a specific volume, and calculates the coefficient of elasticity at the time of the heat curing, based on relations of a reaction rate, ~~and~~ temperature ~~to~~and a coefficient of elasticity.

Claim 3 (Currently Amended) The design support apparatus for a resin mold product, according to Claim 1, wherein:

said residual strain calculation means sets a representative point to each of said first three-dimensional solid element and each of said second three-dimensional solid element;

for each of said second three-dimensional solid elements, said residual strain calculation means calculates averages of temperatures, coefficients of elasticity and strain ~~(or stress)~~ components of at least one of said first three-dimensional solid elements whose representative points are close to a representative point of a second three-dimensional solid element in question, weighting said temperatures, said coefficients of elasticity and said strain ~~(or stress)~~ components according to distances of said representative points from the representative point of said second three-dimensional solid element in question; and sets the calculated averages as a temperature, a coefficient of elasticity and a strain ~~(or stress)~~ component to said second three-dimensional solid element in question.

Claim 4 (Currently Amended) The design support apparatus for a resin mold product, according to Claim 1 wherein:

for each of said second three-dimensional solid elements, said residual strain calculation means calculates residual strain, using the temperature, the coefficient of elasticity and the strain ~~(or stress)~~ component set to a second three-dimensional solid element in question, and using a variation of coefficient of elasticity in a case where said temperature is cooled down to a predetermined temperature.

Claim 5 (Original) A computer-readable medium having a program readable by a computer, wherein:

when said program is executed on said computer, said program implements the flow analysis means on said computer, which is used in the design support apparatus of Claim 1 for a resin mold product.

Claims 6 and 7 (Cancelled)

Claim 8 (Currently Amended) A method of supporting design of a resin mold product, where a computer is used to support design of a resin mold product made of thermosetting resin~~, comprising:~~ by implementing the operations of:

a flow analysis step in which a finite difference method or a finite element method is used to analyze a flow of thermosetting resin injected into a resin filling cavity to mold said resin mold product;

a residual strain calculation step for calculating thermosetting resin's residual strain ~~(or stress)~~ after heat shrinkage of the thermosetting resin injected into the resin filling cavity to mold said resin mold product; and

a strength analysis step in which a finite element method is used to analyze strength of said resin mold product;

wherein:

<u>in said flow analysis step</u>

<u>a reaction rate model is indicated by by using an equation A(t) = Q(t)/ Q(o)</u>

<u>wherein A(t) is reaction rate whose initial value at the reaction is 0,</u>

<u>and the reaction rate in the initial period is saturated toward 1 with lapse of time t,</u>

<u>Q(t) is heat release value until time t,</u>

<u>Q(o) is a gloss heat release value until the reaction ends,</u>

<u>and wherein viscosity η, coefficient of elasticity E(T), and linear curing strain component ε1 are calculated by replacing the changes of each component with the change of the reaction rate A(t).</u>

in said flow analysis step, a temperature, a coefficient of elasticity and a strain ~~(or stress)~~ component of the thermosetting resin at a time of heat curing are calculated for each of first three-dimensional solid elements used for flow analysis;

in said residual strain calculation step, correspondence between each of second three-dimensional solid elements used for strength analysis in said strength analysis step and each of said first three-dimensional solid elements, and the temperature, the coefficient of elasticity and the strain ~~(or stress)~~ component calculated for each of said first three-dimensional solid elements in said flow

analysis step are used in order to set a temperature, a coefficient of elasticity and a strain ~~(or stress)~~ component at the time of heat curing for each of the second three-dimensional solid elements, and residual strain ~~(or stress)~~ after the heat shrinkage is calculated for each of said second three-dimensional solid elements; and

in said strength analysis step, the residual strain ~~(or stress)~~ after the heat shrinkage, which is calculated in said residual strain calculation step, is set to said each of said second three-dimensional solid elements, and the strength of said resin mold product is analyzed.

Claim 9 (New) A design support apparatus for a resin mold product made of thermosetting resin according to claim 1, wherein

in the flow analysis means the reaction rate A(t) for a time period t is calculated from equations 1-5 as given below:

$$\partial A(t)/\partial t = (K_1(T)+K_2(T)A(t)^M)\,(1-A(t))^n \cdots \text{Eq. 1}$$

$$K_1(T) = K_a \exp(-E_a/T) \cdots \text{Eq. 2}$$

$$K_2(T) = K_b \exp(-E_b/T) \cdots \text{Eq. 3}$$

$$A(t) = Q(t)/Q_0 \cdots \text{Eq. 4}$$

$$\partial Q(t)/\partial t = Q_0(K_1(T)+K_2(T)A(t)^m)\,(1-A(t))^n \cdots \text{Eq. 5}$$

wherein A refers to a reaction rate; t to time; T to temperature (molding condition, function of time t); $\partial A(t)/\partial t$ to a reaction rate; $K_1(T)$ and K_2 (T) to coefficients as functions of temperature; N, M, Ka, Kb, Ea and Eb to intrinsic coefficients of the material; Q(t) to a heat release value until time t; Q_0 to a gross heat release value until the end of the reaction; and $\partial Q(t)/\partial t$ to a heat release rate,

and the viscosity η is calculated from equations 6-7 given below

$\eta = \eta_0 (T)((1 + A/A_{gel})/(1 - A/A_{gel}))^{C(T)}$ ••• Eq. 6

$\eta_0 = a \exp(b/T)$ ••• Eq. 7

$C = f/T - g$ ••• Eq. 8

where, η refers to a viscosity; η_0 to an initial viscosity; T to temperature; A to a reaction rate; A_{gel} to a reaction rate at gelling; C to a temperature-rise coefficient; and a, b, f and g are intrinsic viscosity parameters of the materials, and

the coefficient of elasticity E(T) is calculated from an equation given below,

$E(T) = E_{gel}(T) + (E_0(T) - E_{gel}(T))(A - A_{gel})/(1 - A_{gel})$ ••• Eq. 14

wherein, $E_{gel}(T)$ refers to the coefficient of elasticity at gelling at the temperature T; $E_0(T)$ to the coefficient of elasticity at the end of the reaction at the temperature T; and A_{gel} to the reaction rate at gelling, and

the linear curing strain component $\varepsilon 1$ is calculated from an equation given below:

$\varepsilon 1 = \Phi \Delta A$ ••• Eq. 18

wherein Φ refers to a linear curing shrinkage coefficient; ΔA to the reaction rate at curing minus the reaction rate at gelling.